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Journal of the Society of Arts.

FRIDAY, JULY 6, 1866.

Announcements by the Council.

COUNCIL MEETING.

Wednesday, July 4th, 1866.

At the first meeting of the present Council since their election, Sir Thomas Phillips, Q.C., F.G.S., Vice-President, was unanimously elected Chairman for the current year.

Proceedings of the Society.

FINAL EXAMINATION, 1866.

The following addition must be made to the list of certificates already published:—452, Forster, James, jun., 18, Hull Young People's Institute, clerk—German (2d).

Proceedings of Institutions.

STOURBRIDGE ASSOCIATED INSTITUTE.—This comprises the Mechanics' Institution and the Working Men's Institution. The report of the former for 1865 says that the total number of members during the year has been 125, of which 45 are annual, and 80 quarterly, being a decrease of two quarterly members since last report. The income for the year, including a balance of £10 2s. 7½d., brought forward from last year, has been £71 12s. 7½d., and the expenditure £61 6s. 5d., leaving a balance of £10 6s. 2½d. in favour of the Institution. The librarian reports that he has issued the following works:—History, 89; memoirs, biography, and travels, 77; natural and mental philosophy, 9; moral and political philosophy, 11; natural history, 25; mechanics and the arts, 27; novels, 300; poetry, 29; magazines, 251; miscellaneous, 109; total, 927, being a decrease of 169 on the previous year. A box of books, containing 35 vols., belonging to the Worcestershire Union of Institutes, has been at the Associated Institute for a period of two months, and arrangements have been made to subscribe to Mudie's Library, by which 20 vols. of books, which may be exchanged once a month, are added to the library. A class for the study of political economy, conducted by the Rev. D. Maginnis, has been in operation during nine months of the year, with the exception of the usual interval during the summer season. A class for adult females has been successfully carried on, there having been an average attendance of 13. The prize of £1, given by the Right Hon. Lord Lyttelton, for Whateley's Easy Lessons in Money Matters, and a prize for mechanical drawing, both in connexion with the Worcestershire Union of Educational Institutes, were gained by members of the Associated Institute. An address by Mr. Jones, the Secretary of the South Staffordshire Association, on "The Advantages to be derived from the Society of Arts' Examinations," was made, and a lecture by Mr. George Dawson, on "Richard Cobden," was delivered in Union Hall. The committee regret that owing to the expense attending lectures, they find it impossible to arrange for such a number as they could wish. The annual accounts of the penny bank show that £238 9s. 1d. had been deposited, and £254 12s. 5d. repaid to depositors, and that a balance of £121

was standing to the credit of the depositors. The managers have transferred their balance to the Post Office Savings' Bank. Delegates from the Associated Institute have attended several large meetings during the past year, calculated to promote the usefulness of educational institutions, viz.,—one at Wednesbury, one at Willenhall, and one at Kidderminster. A festival of the members was held in the lecture-room of the Institute, and realized a profit of £1 12s. 4d., which sum was devoted to a special purpose. The annual *soirée*, in connexion with the Associated Institute, was revived this year, and under the management of a committee of ladies resulted in a net profit of £11 10s. 2d. The penny entertainments are still continued, and have resulted in substantial proofs of their popularity. The season of ten nights, previous to Christmas last, averaged in attendance nearly 600, and resulted in a profit of upwards of £17, in addition to £6 14s. 6d. realized on the last evening, which was devoted to the benefit of the Ragged School. The Entertainments' Committee have given a donation of £10 for the purpose of being expended on the library. —With regard to the Working Man's Institution, it appears that the number of members upon the books at the end of the year was as follows, viz.:—Annual, 19; quarterly, 21; monthly and weekly, 31; total, 71. The income for the year (including the balance brought forward and a donation of £10 from the Entertainments' Committee) is £35 2s. 2½d., and the expenditure £28 3s. 4½d., leaving a balance in the hands of the treasurer of £6 18s. 10d. The total number of volumes now in the library (including new books) is 844. The number of issues during the year is 953, which falls far short of last year. The following are the only classes that have been in operation during the year, viz.,—The political economy class, under the superintendence of the Rev. D. Maginnis, and a class for female adults, conducted by ladies of the neighbourhood. One lecture only has been delivered during the year, by George Dawson, Esq., on "Richard Cobden." The committee, in concluding their report, "regret that although they have announced classes, provided teachers, and arranged other details, no response has been made by pupils joining such classes; and the experience the committee have had in providing lectures, leads them to think that lectures are not appreciated in the way they ought to be; that recreation, blended with intellectual amusements, are called for by the public rather than studies of a more solid and lasting character. The real aims of the Institution are not therefore attained so fully as could be desired. Although the committee do not pretend to point out the exact causes that are in operation, tending to hinder the carrying out the proper aims and objects of these Institutions, they cannot shut their eyes to the fact that educational institutions of this class are passing through a particular phase of their existence. On the one hand, a great cry is heard as to the necessity and desirability of educating the rising generation; on the other hand, this, and kindred institutions, offer great facilities for acquiring what is called for; but where are the youth, on whose behalf the cry is raised?"

EXAMINATION PAPERS, 1866.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April last:—

ARITHMETIC.

THREE HOURS ALLOWED.

1. Find by practice the value of 319 cwt. 3 qrs. 16 lbs. at £2 12s. 6d. per cwt.
2. What will be the purchase money of an estate containing 191 ac. 3 ro. 37 po. at £47 17s. 7d. an acre?
3. If I gain 3s. 4½d. of profit on every guinea of outlay, what amount of outlay will gain £2 16s. 3d.?
4. If the carriage of 6 cwt. 2 qrs. for 124 miles cost

£3 4s. 8d., what weight should be carried 93 miles for £3 0s. 7½d.?

5. After I had gone $\frac{3}{4}$ of $\frac{1}{2}$ of twice my journey I had $10\frac{1}{2}$ miles further to travel. What was the whole distance?

6. If 4 yards of wire $\frac{1}{8}$ of an inch thick weigh $6\frac{1}{2}$ oz., what would 72 yards of wire $\frac{1}{4}$ of an inch thick weigh?

7. Two merchants join their capitals, which are such that for every £3 advanced by A, B puts in £4. At the end of 4 months A increases his capital by $\frac{1}{4}$, while B withdraws $\frac{1}{4}$ of his. What portion of a loss of £170 at the year's end should each sustain?

8. A sells at 3s. 6d. a gallon with 6 months' credit and $2\frac{1}{2}$ per cent. discount; B sells at 3s. 5d. a gallon with 3 months' credit and no discount. How much per gallon does the one sell cheaper than the other, the use of money being equal to 10 per cent.?

9. A person bought goods for £40, and sold half of them at a profit of 5 per cent. For how much must he sell the remainder so as to realise 20 per cent. upon the whole?

10. A company has 50 ships averaging 375 tons each. In every 3 weeks 3 tons produce a clear gain of $\frac{1}{3}$ of a guinea, giving to each partner an annual income of £3,500. Find the number of partners.

11. The rent of a farm is a fixed sum, together with the value of a certain number of bushels of wheat; when wheat is 56s. a quarter the rent is £250, when at 60s. it is £260. What will it be when wheat is 80s. a quarter?

12. During the first six months of the year the income tax is at the rate of 7d. in the pound, and during the last six months it is at the rate of 5d. in the pound. If a person's income tax amounts to £21 what is his gross annual income?

13. To what amount must goods worth £1,200 be insured at $1\frac{1}{2}$ per cent, so as in case of loss to cover the value of the goods and the premium?

14. A watch which loses 4 minutes daily is set right at 12 o'clock. What will be the true time a week afterwards when the hands point to 12 o'clock?

15. By selling apples at 8 for $6\frac{1}{2}$ d. a person gains $8\frac{1}{2}$ per cent. What would he gain or lose by selling 3 for $2\frac{1}{2}$ d.?

16. A person borrows £163 6s. 8d. at 5 per cent. per annum, and at the same time £400 at 4 per cent. per annum. He repays altogether £581 9s. 2d. How long did he retain the money borrowed?

17. By transferring £5,000 stock from the 3 per cents at 72, to the 4 per cents, a person's income is increased £10. What is the market price of the latter stock?

18. A person invests £120 at the end of each year at 5 per cent. per annum. How much will this amount to at the end of four years, reckoning compound interest?

19. If the carriage of 1,875 tons for 60 miles be 9s. 4½d., what distance should 13½ tons be carried for 27s.?

20. Bought 50 barrels of porter and 60 of ale for £380, and sold the whole for £412, at a profit of 7 per cent. on the porter, and 10 per cent. on the ale. What was paid for a barrel of each?

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

1. What is book-keeping by double entry, as distinguished from single entry?

2. When is a ledger kept by double entry said to balance?

3. Can errors exist in a ledger that balances? If this be answered in the affirmative, support the answer by an example or examples.

4. If, on examining the books, it be found that the following entries, viz. :—

Wine purchased of J. Smith..... £100 0 0
Discount allowed by me to J. Locke ... 6 4 0

have been journalized and posted as if they had been as follows, viz. :—

Wine purchased of J. Smith..... £110 0 0
Discount allowed to me by J. Locke ... 6 4 0

set forth the journal entries necessary to correct these errors.

5. Journalize and post in proper technical form and language the following imaginary transactions, and make out from the ledger a trial balance, a profit and loss account, and a balance sheet :—

John Ward takes W. Campbell into partnership on 1st January, 1866. John Ward's assets and liabilities are as follows, viz. :—

ASSETS.

Sherry £2,250 0 0
Brandy 300 0 0

Sundry debtors to him, viz. :—

A. Green 200 0 0
J. Smith 50 0 0
T. Jones 100 0 0
Bills receivable..... 262 0 0
Cash..... 1,000 10 6

LIABILITIES.

Bills payable..... 150 0 0
Due to P. Robb 20 10 0
Due to F. Brook 132 4 0

W. Campbell's capital amounts to £2,000 cash.

N.B.—The capital and drawings of the partners are subject to interest at 5 per cent. per annum, and the balance of the profit and loss account is divisible thus :—
To John Ward, *two-thirds*; to W. Campbell, *one-third*.

1866.	£	s.	d.
Jan. 1. Paid cash for purchase of business premises.....	1,500	0	0
„ Advanced for petty cash	20	0	0
2. Received cash from J. Wilson, in payment of his acceptance due this day	62	0	0
3. Consigned to P. Walker, to be sold by him on our account and risk, brandy invoiced at	225	0	0
„ Bought of F. Brook, sherry.....	75	0	0
4. Paid cash for our acceptance of J. Ward's draft, due this day	150	0	0
5. Sold P. Robb brandy	20	0	0
6. Received A. Green's acceptance, at 21 days, in payment of amount due by him ..	200	0	0
„ Received cash from J. Smith.....	50	0	0
8. Discounted A. Green's acceptance for £200, and received cash £198, and allowed discount £2	200	0	0
11. Advanced for petty cash	30	0	0
„ Received from P. Walker on account of consignment of brandy ..	100	0	0
12. Lent cash to J. Smith.....	100	0	0
13. Sold sherry for cash.....	400	0	0
„ Sold sherry to A. Green	800	0	0
„ Received from A. Green his acceptance, due 16th April.....	800	0	0
15. Bought sherry of J. Potts	1,500	0	0
„ Paid cash to J. Potts on account...	750	0	0
„ Accepted J. Potts' draft at 2 mos.	750	0	0
17. Bought brandy for cash	300	0	0
19. Cash drawn out by J. Ward	100	0	0
20. Received cash of T. Jones, by way of composition, in discharge of his debt of £100	50	0	0
22. Received account sales from P. Walker, showing that the above consignment of brandy to him realised net	285	0	0
„ Received cash from P. Walker, balance of amount realised, viz.	185	0	0

Jan. 24. Paid cash for repairs of premises	10	6	0
25. Sold for cash, brandy	150	0	0
26. Paid cash for fire insurance.....	20	0	0
30. Bought sherry from J. Potts	900	0	0
„ Paid to J. Potts, A. Green's acceptance, due 16th April.....	800	0	0
„ Paid cash to J. Potts	100	0	0
31. Paid salary of clerk	10	0	0
„ Trade charges, paid out of petty cash	40	2	0
„ Interest on amount drawn out by J. Ward	0	3	4
„ Interest on J. Ward's capital.....	16	1	8
„ Interest on W. Campbell's capital ..	8	6	8
„ Stock of sherry in hand ..	3,925	0	0
„ „ brandy „	100	0	0

ALGEBRA.

THREE HOURS ALLOWED.

1. Find the greatest common measure of $x^2 + x - 2$ and $x^2 + 3x + 2$, and also their least common multiple.

2. If S_i represents $\frac{a^i}{(a-b)(a-c)} + \frac{b^i}{(b-a)(b-c)} + \frac{c^i}{(c-a)(c-b)}$ prove that $S_0 = 0$ $S_1 = 0$ $S_2 = 1$.

3. Extract the square root of $13 - 4\sqrt{10}$ under the form of a quadratic surd.

4. Solve the equations:—

$$x - 2y + 3z = 10.$$

$$x + 3y + 2z = 25.$$

$$2x + y + 4z = 30.$$

5. Sum the series $1 - 2 + 3 - 4 + 5$, &c., to 101 terms.

6. A farmer bought a flock of 60 sheep, of which three died, but by selling the remainder at 2s. per head more than he paid for them, he realised a profit of £1 10s. on the transaction. Find the cost price of the flock.

7. If a number contains n digits, prove that its square root contains $\frac{n}{2}$ digits if n is even, and $\frac{n+1}{2}$ if n is odd.

8. If a and b are the roots of the quadratic equation $px^2 - qx + r = 0$, prove the equality $\frac{1}{a} + \frac{1}{b} = \frac{q}{r}$ and if $a = b$ find the relation between p , q , r .

9. Distinguish between interest and discount, and show that the latter is half the harmonic mean between the former and the principal sum.

10. Show that in the expansion of $\frac{1}{(1-x)^n}$ by the binominal theorem, the $(n-1)^{th}$ is half the n^{th} coefficient for all values of n .

11. Supposing the odds to be 3 to 2 against A solving one of these questions, 2 to 3 against B solving it, and that it is an even chance that C can do so; find the chance that a solution will be obtained if all three try.

(To be continued.)

THE CAUSE OF SHIPWRECKS AND LOSS OF LIFE AT SEA.

By J. W. WOOD, ESQ., BOARD OF TRADE RECEIVER OF WRECK, HARWICH.

The object of this paper is to touch upon some of the causes leading to shipwreck and loss of life at sea which may have escaped notice; the want of auxiliaries to existing means and appliances for the prevention or mitigation of such shipwreck and loss; and means supposed to be attainable to those ends.

It will, I dare say, be remembered that a deputation from the Social Science Association had an interview with the President of the Board of Trade, in February last, with the view of obtaining a Royal Commission of Inquiry into these subjects, but without the expected result.

My object in venturing to write publicly upon such important subjects at all, is simply to aid inquiry and discussion now taking place, by the relation of some practical experience, and also the introduction to notice and consideration of certain tested but comparatively unknown means and appliances available towards the ends in view, in the hope that good may result.

I invite attention:—

First—To the ignorance of a large proportion of our merchant seamen as one of the indirect causes leading to shipwreck and loss of life; to the importance of their improvement in this respect; and to the details of a means towards its attainment which has been already successfully tried on a small scale; then to some other causes which do not appear to me to have attracted attention; and,

Secondly—To the want of an auxiliary to present means for saving lives in cases of shipwreck, capable of being used either from the ship or from the shore, with the details of an invention introduced for the purpose, illustrated by diagrams.

First, with regard to our merchant seamen, on whose intelligence as well as bodily strength the safety of life and property at sea is, to no inconsiderable extent, dependent.

A service of many years on the coast in different parts of the kingdom, both as superintendent of mercantile marine, and receiver of wreck, has brought me much in contact with seafaring men of all kinds; and, considering that our mercantile marine is not only one of the most necessary and useful classes of the community, but that it would probably be England's chief bulwark in the hour of necessity, the importance of endeavouring to raise the tone and character of the men has from time to time engaged my attention.

That many of the disputes which occur between masters and seamen, causing inconvenience and oftentimes loss to owners, are the result of ignorance on the part of the men, my own experience could testify. The unavoidable haste in which crews are oftentimes got together and shipped, although the agreement they enter into is read over to them previous to their signing it, does not afford them much time for reflection, neither are the men always in a condition to reflect; and what can be the use of the copy of the agreement which is required by the Merchant Shipping Act to be made accessible to them on board, if they are unable to read it, and understand what they have really bound themselves to perform? It follows that, in too many cases, it is left to the interpretation of a black sheep among them, familiarly known as a Sea Lawyer, who manages to unsettle the minds of his mates for his own purposes or pleasure, which may not only cause general confusion and discomfort during a voyage, but, by weakening discipline, prove a great source of evil in the hour of danger.

That much of the thoughtlessness of our merchant seamen may also be attributed to ignorance will probably be conceded, but it is unfortunately not confined to men before the mast, for I have met with masters of coasting vessels barely arrived at middle age who could not write their names, while many others could only do so with much difficulty. It is not probable that their reading would be much better than their writing, in which case it is not difficult to conceive that their navigation would be of a rather haphazard description. I have seen this to some extent exemplified on taking depositions in cases of shipwreck (especially amongst men of the class alluded to), having found it to be not only most difficult to elicit anything like an intelligible version of the facts, but on asking an opinion as to what might be the cause of the casualty, I have found them to be *entirely* "at sea." It is not many weeks since that I met with the master of a collier on board a river steamer; and while conversing with him on the subject of one of those recent heavy gales which have been since found to have caused such fearful loss of life, he told me that he was out in it, and had had a narrow escape with his old craft. He had

lost his anchor and chain, which had been in use many years, but got safely into port during the night *somehow*, he didn't know how, but he supposed his "time wasn't come yet." He had just been to a marine store dealer, and bought a new chain, &c. Seeing a piece of very old chain of various sizes linked together lying on the deck, I asked him if that was it? He said "Yes." When I observed, "You surely don't mean to put to sea with such a thing as that?" To which he replied, "Lor bless you; why not? The chain's a good chain enow, and a sight stronger nor the one I lost."

I would not have it inferred that the class of masters in the coasting trade is by any means *composed* of such men, but I fear they are still numerous, in spite of the improvements which have been effected of late years; and the loss of vessels commanded by them, as well as the too often consequent loss of life is not very surprising; indeed I have often been led to wonder that, great as it is, it is not greater.

May not those fruitful sources of danger and disaster, neglect of the lead, of the influences of tidal currents, and the non-observance of, or inattention to meteorological changes, also be attributed to a great extent to the causes I have mentioned?

The remarks I have made are of course not intended to apply in any degree to merchant commanders generally, especially of the certificated and upper class, of whom England may be justly proud. What I desire to show is, that although a vast amount of improvement has been effected in our mercantile marine of late, by means of the Homes, Savings Banks, and the Naval Reserve, still much remains to be done, and I think may be done at once with advantage, instead of deferring it till the present generation of boys have been converted into able seamen. It is not my object to point out all the evils attendant on the ignorance of our merchant seamen, and I will therefore conclude this part of the subject by detailing the practical result of my reflections upon it some time ago.

Considering that education, even of an elementary character, leads to self-respect and expansion of the reflective and reasoning faculties, I was induced to try if seamen could be led to accept it, and the result was sufficiently satisfactory and (as it appeared to me) demonstrative of the suitability of my plan for more extended adoption, to induce me to make it known by a letter in the *Shipping and Mercantile Gazette* of the 7th May, 1864, when the editor, in an able leading article on the subject generally, warmly commended it to the attention of the Government and the public. The following is an extract from the letter giving the details:—

"It has been a source of regret to me to see, on shipping and discharging crews, the large proportion of men who can neither read nor write, or, if able to read a little, are unable to write at all. That there is no insurmountable difficulty in the way of meeting this I feel tolerably certain, having (under many disadvantages) personally tried the experiment by opening an adult evening school during the six winter months, for the benefit of resident seafaring men and any sailors in port, who chose to avail themselves of it, when seamen, from youths of 17 to bald-headed middle-aged men (including naval reserve men on drill) availed themselves of it, and evinced such an earnest desire and endeavour to progress, as to afford me a pleasure which I am sanguine enough to hope others may also like to enjoy, and I therefore beg to offer the following concise description of the simple plan adopted:—Having obtained the use of a large room belonging to the Government, which was disengaged two evenings in the week, put a stove into it, obtained the loan of forms and tables, and laid in a stock of coals and candles, I sought and readily found suitable assistants in two of my subordinates, also a military officer, and a gentleman residing at the port, and had placards conspicuously posted inviting seafaring men above the age of 17 to attend at the well-

known room, and intimating that every Tuesday and Thursday evening, from seven to nine o'clock, they might there receive instruction in reading, writing, and arithmetic, for which each person availing himself of it would have to contribute one penny towards the cost of coals and candles. Then borrowing and purchasing a small supply of books and stationery, I arranged the classes, taking the writing class myself as the most important for obvious reasons, especially as the readiest means of conveying the largest amount of general instruction, and selecting some pithy sentences of a useful tendency for copies, I wrote them on slips of paper, posting one of a different sized hand on each upper side of a small triangular piece of wood, so that two men writing on either of the military tables used, might, by simply turning the piece of wood, each have a fresh copy. After a time those who had made sufficient progress were formed into a class for writing from dictation, the selections being sufficiently interesting as well as instructive (while improving the reading and writing), to convey a considerable amount of useful information. This class provided their own writing books, which were corrected and returned to them every night for future reference; and it was exceedingly satisfactory to note the spirit of friendly emulation excited, and the rapid progress made. The other classes were conducted in what I believe to be the usual way. I never heard an unseemly or angry word on any occasion, and feel persuaded that there is a growing feeling amongst the men that such instruction is a boon. There may not be a free room available at every port, but I am much mistaken if the small amount necessary at starting might not be raised anywhere without difficulty; and if the foregoing, or some more perfect plan, should be tried, I have strong hopes that such schools would soon become general and self-supporting, especially if the promoter and head should be a man of authority and position, well-known to, and liked by, the seamen of the port."

Such was the simple course pursued, not only with satisfaction to myself, but I have reason to hope with benefit to others, and it has been a source of regret to me that, in consequence of the opening of an extensive Continental steam traffic at Harwich shortly after, my limited leisure became so entirely engrossed by official duties as effectually to prevent a continuance of it. Many a time have I been anxiously asked by some of my old pupils when I was likely to resume it, but I have been unable to do so.

Amongst the other causes which may not have attracted the attention they appear to me to deserve, I may mention the large masses of wreck which have been allowed to drift about in the fairway of ships, and being so low in the water as to be almost invisible at night, must be nearly as dangerous as sunken rocks, especially to steamers. How much damage, and oftentimes loss of life, may be occasioned by the whole or the half of a hull so drifting, before it is carried on shore by tidal influence, may be conceived. It may be said, "then why not remove it when within reach, as it generally is when the danger is greatest; the property would pay for it?" The reason is a very cogent one—the labour and risk in securing it are generally so great that the ordinary salvage reward which might be derived from the net proceeds of sale is often wholly insufficient as a remuneration, and salvors are led to pass it by for more certainly profitable employment.

I had a case of the kind to deal with a few years ago. The bottom of a vessel about 300 tons register was found drifting at sea off Aldborough, and 4 smacks, with 21 men, after unusual risk and labour in a heavy sea, succeeded in towing it into Harwich. The amount of salvage awarded (and it was all that could be awarded) was £79, yielding (after payment of the smacks) about 13s. 6d. per day to each man, a sum justly estimated as insufficient either for reward or encouragement.

Considering the removal of drifting wreck a matter of some consequence, I wrote to the Secretary at Lloyd's,

stating the case, and suggesting the advantages which might accrue to that association and to the shipping interest by a pecuniary encouragement to salvors, apart from ordinary salvage, to clear the fairway of such dangerous obstructions to navigation, such reward being made proportionate to the nature and extent of the services rendered to underwriters, on the facts being verified by receivers of wreck, through whom the reward might be paid. But the committee did not consider it expedient to entertain the suggestion, and I have not had a case of the kind since.

Another source of danger and loss I believe to be the carrying of deck cargoes during the winter months, especially of live stock by steamers (even passenger steamers) in the Baltic, home, and coasting trades. How many vessels may have been totally lost from this practice I am not in a position to state, but I will give a slight illustration showing what might result.

A beautifully-modelled iron paddle steamer, of 484 tons register, and over 700 tons burthen, licensed to carry 547 passengers, exclusive of the master and thirty hands, in all 577 persons, with the amount of boat accommodation required by the Merchant Shipping Act for about eighty of them (supposing it to be all available)—indeed legally well found and in good sea-going condition—was very recently crossing from Antwerp with passengers, and, besides a large general cargo, 2,030 sheep and 289 pigs. The 289 pigs and 1,000 of the sheep were carried on deck, 500 more being carried on the bridge. Is it surprising that with a light draft of water (8 feet), and so much top hamper, she should labour heavily in a cross sea? It is true that the weather was fine when she started in the afternoon, but the wind freshened, and about midnight, when she was in mid-channel, it came on to blow a strong gale, with a heavy sea. Her commander, a smart and experienced seaman, tried all he could to get her head to wind, but without success, and a more than ordinary heavy sea striking her, she was laid on her beam ends, and in imminent danger of going down. He then, with prompt judgment, and the aid of a few of his crew, succeeded, after much difficulty, in getting about 700 of the sheep overboard, when she slowly righted herself, and lay-to till the gale abated. Had the deck cargo consisted of cattle instead of sheep and pigs, it is probable that neither the vessel nor those on board would have been ever more heard of.

If those who take an interest in the safety of the sea-going subject would seek for evidence on this point, I think that they might obtain abundance without difficulty.

That some attention was once given to the danger of vessels carrying deck cargoes during the winter months, is evidenced by the 16 and 17 Vic., cap. 107, secs. 170, 171, and 172, which enacts, "That no vessels trading between the North American colonies and the United Kingdom with wood goods shall carry deck cargoes between the months of August and April, under a penalty of £100." The reason for this is given in the 5 and 6 Vic., cap. 17, which recites, "That great loss of life and severe sufferings have been occasioned amongst the crews of ships and vessels, laden with timber and wood goods, from British ports in America, from the practice of having a portion of the cargo stowed on or above deck;" and proceeds to interdict it. The same provisions were perpetuated by the 8 and 9 Vic., cap. 45, repealed by cap. 84, and re-enacted by cap. 93, then embodied in the Act first referred to, and since again repealed by the 25 and 26 Vic., cap. 63, sec. 2.

I now come to my second subject, viz., the necessity for an auxiliary to existing means and appliances for saving life in cases of shipwreck, and a means supposed to be available to that end. That such is sadly wanted, has been abundantly proved in a variety of ways of late years, by the wreck of the *Royal Charter*, the *Orpheus*, the *Stanley*, the *Bombay*, the *William Nelson*, with hundreds of others of different classes, the best remembered, and probably the saddest of all, being the recent loss of the *London*.

A receiver of wreck, in his examinations on oath of the masters of vessels or survivors in cases of casualties at sea, has the horrors of shipwreck in most of its varieties, with the causes which led to them, brought frequently and prominently before him, although in a plain matter of fact way. No man so situated, and possessing the commonest feelings of humanity, could, I think, view such a subject with indifference; and having been an eye-witness as well as an investigator, I have been led to think deeply upon it. What appeared to me—and still appears to me—to be wanted, is a combination of something cheap, strong, portable, plain to the meanest capacity, and at the same time a reliable means of safety, as an auxiliary to boats in all classes of emergency. Several years of anxious study at length led me to a practical result in the shape of my portable life raft, or raft boat.

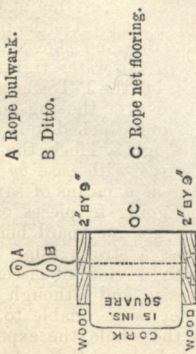
After having perfected my plan, constructed a model, and submitted them to the severest criticism I could obtain, which I was enabled to do from almost every class of scientific and nautical opinion, finding them to be generally approved, I sent the particulars to the *Shipping and Mercantile Gazette*, of the 11th November, 1864, making the benefits of my invention a free gift to the shipping interest, for the purpose of saving life at sea, in the hope that as by that course there would be no restriction in the way of its trial, and (if approved) subsequent adoption, it might be the means of saving many valuable lives. The winter passing, wrecks occurring, and no result being apparent; as the spring of 1865 approached I consulted the then Mayor of Harwich, Mr. Patrick, with a view to obtaining further opinions and a trial, when that gentleman, with his usual kindly public spirit, called a meeting at the Town-hall, which I attended. The hall was crowded with captains of vessels, salvors, and other practical men, and my model and explanations being unanimously approved, a subscription was raised, a raft built under my superintendence in London, and launched at Harwich in the month of May, when it was tried off Felixtowe by the inspecting commander of Coast Guard, by order of the Admiralty, in regard to one of its uses, viz., as an adjunct to the mortar and rocket apparatus. I was present at the trial, with a number of nautical men of different classes, who pronounced the raft a success. The naval officer also, I believe, made a favourable report to the Admiralty on the subject, but still no result. I then sent a model and particulars to the Dublin Exhibition, where I have been informed it was much commented on and approved, Prince Napoleon amongst others requesting a scale drawing and detailed particulars, with which I furnished him; and on the close of the exhibition I received a medal and diploma, with a very gratifying letter of approval from one of the naval jurors.

The loss of the *London* attracting public attention, I paid a visit to town with my model, and was gratified to find that the scientific and nautical men to whom I exhibited it were of opinion that the raft might have been of much use even in that desperate case.

The accompanying diagram represents two rafts, each 20 feet long, joined together at their bases, and forming a raft-boat. It will be more convenient for illustration, in the first place, to take a half or triangular section, and consider it a raft 20 feet long by 13½ feet base.* It will be observed that in its portable state there are three beams lying parallel; that they are composed chiefly of cork slabs pegged together diagonally 15 inches square; that a planking of Scotch larch, 2 inches thick by 9 inches wide, is placed on the top and bottom of each, flush with the inner side, and bolted through all, so as to form strong and light composite beams with a projection of six inches of cork on the outer side, two of them being 20 feet and the third 12½ ft. long; also that the ends are made of solid wood, tongued, so as to form joints

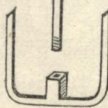
* The scale models and full-sized working raft may be seen at Harwich.

SECTION OF BEAM,
Showing its composition, also depth from upper
bulwark line to net flooring.



METAL BANDS

Containing nuts to receive hollow-headed side-
screws sustaining and confining net
flooring rods.



Hollow-headed side screw.

HOLLOW-HEADED SCREW STAN-
CHION.

A Ring for bulwark line.

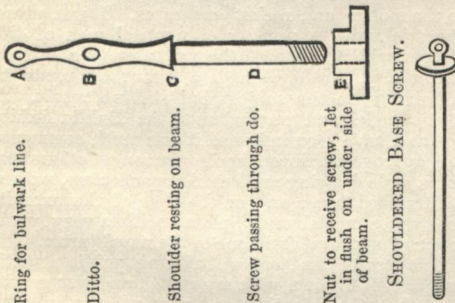
B Ditto.

C Shoulder resting on beam.

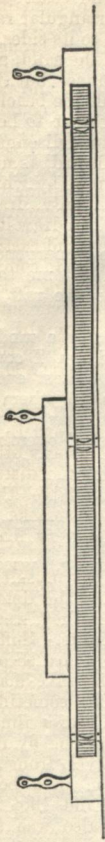
D Screw passing through do.

E Nut to receive screw, let
in flush on under side
of beam.

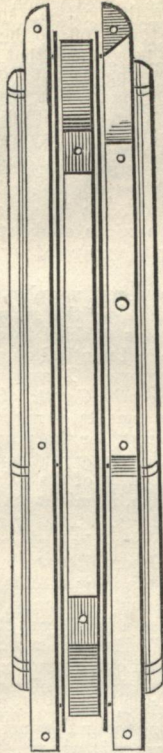
SHOULDERED BASE SCREW.



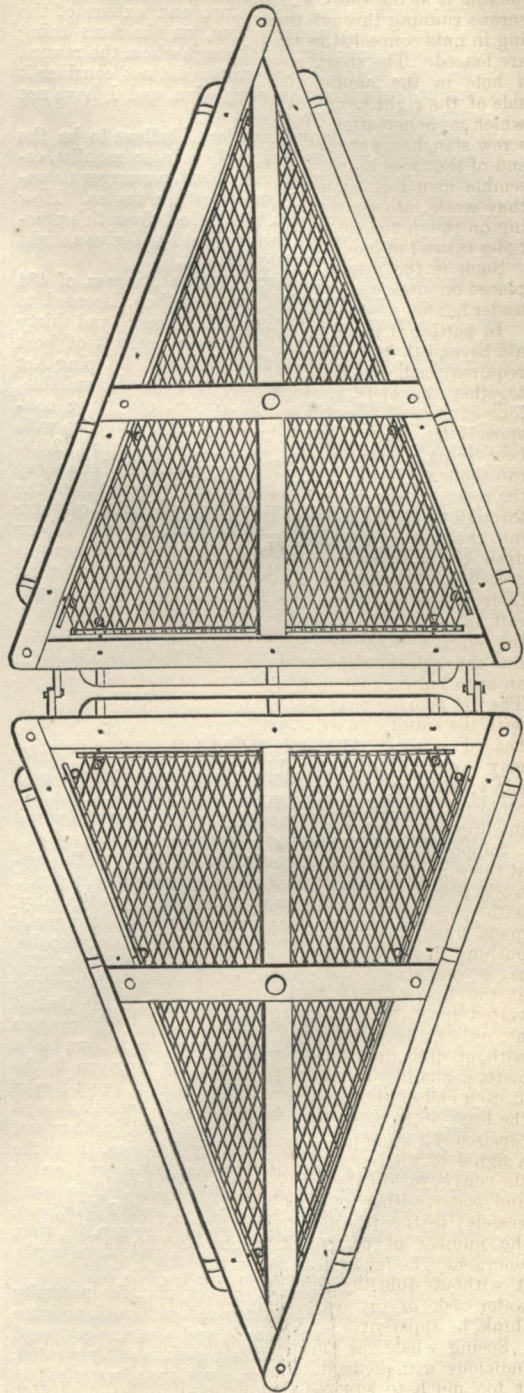
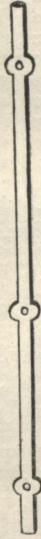
SIDE VIEW ON DECK.



BIRD'S EYE VIEW ON DECK.



METAL ROD SUSTAINING NET FLOORING.



RAFT BOAT.

somewhat resembling a mortice and tenon; that a piece of similar planking, without cork, lies under the centre beam (the use of which will be presently seen), and under that again a fold of rope netting rove on iron rods connecting it at the sides, and regulated by hollow-headed screws running through them and the beams, and working in nuts concealed in the iron bands with which they are braced. The short piece of similar planking with a hole in the middle of it, is fastened to the upper side of the right hand main beam in the cross brace, of which more hereafter. It will be seen that the shouldered screw stanchions at each corner, and also those at each end of the cross brace pass through the beams, and resemble man-rope stanchions, with this difference, that they work into screw plates, let in flush with the planking on the under side, and have two equi-distant rope-holes instead of one.

Such is the raft in its portable state, two of which placed on deck, say one on each side of the long boat under her bilge, would occupy very little additional space.

In putting it together you will see that no extraneous aid beyond that of a marine-spike or piece of old iron is required, each part being complete in itself. I first draw together the ends of the two side beams having the longest tongues, and extend the other ends, which spreads the rope netting; take the beam which has been lying in the centre, and place it at the base; run the loose iron rod through the meshes at the base of the rope netting; lay it on the shouldered screws running through the base beam; fit the centre longitudinal plank into the grooves made for it; lift the screw stanchions, draw the corners together, also the loose end of the cross brace from right to left; return the stanchions to their places, and after a few turns of each screw, the raft, in shape an isosceles triangle, and nearly resembling the letter A, is constructed. I then run the double life-line through the holes in the stanchions, by which means an open bulwark is made, and it is ready for launching. The net flooring may be tightened or loosened at will, with the aid of a marine-spike inserted in the hollow-headed screws. Although the details of construction may appear tedious and somewhat complicated on paper, they are practically as simple as possible, and could not well be misunderstood by the most ordinary intelligence.

Supposing the second raft to have been put together at the same time as the first, and the vessel to be in the worst possible condition, lying like a log upon the water, with spars and boats gone, you will see that as they are made flush underneath there will be no difficulty in pushing them overboard, and when overboard that there are several strong and simple means of connecting them at the base of each, by which they may be easily converted into a wave-line two-masted lug-sail raft boat, not only fit for sailing, but also capable of being rowed without difficulty, by passing oars through the grummetts pendant from the hollow-headed screw stanchions at each end of the cross braces. You have now, to say the least of it, a skeleton boat, which can neither be capsized nor swamped, a means of making conspicuous a signal of distress, and the power of progression, and the conveyance of about 50 persons, with cask, provisions, and water, either to the shore, or to the fairway of vessels; further, should its flotation be insufficient for the number of persons, it might, in certain cases of emergency, be required to carry, the power of increasing it without difficulty, and in little time, by means of water casks or any spare spars or wood at hand, will, I think, be apparent.

Seeing what was effected by one small boat, and its judicious management, in the case of the *London* is it too much to suppose that many, if not the greater part of the unfortunate crew and passengers who went down with that vessel might have been saved, had she been supplied with a number of such raft-boats, proportionate to her size and average complement of persons on board?

We will next view the matter from the coast—say from a life-boat station. Consider the triangular raft, with a pair of wheels temporarily attached to its sides, as a carriage for the life-boat.—A ship is on the sand, and the life-boat is towed off to her assistance, but the water is found to be so shoal that she would be beached and lost in attempting to get sufficiently near to be of any service. There is the raft, ready to hand; disengage the wheels, launch, and tow it off to windward, as near the wreck as possible, then pay away the rope by which it is secured till it reaches the wreck (for it only draws four inches of water); then those on board can draw it to the lee-side, jump in without fear of injury, and casting off the line let it drift to leeward till picked up in comparatively smooth water. Observe that there is no risk to life in using it as in using a boat; and, however much knocked about, and, possibly, damaged it might become, would not the saving of even one life more than equal the whole value of a raft costing about £20 or £25?

It has been suggested to me that if such rafts, of convenient size, were kept ready for use on board Light vessels, say at the mouth of the Thames, or any other places where dangerous shoals abound, and too distant from the shore for a life-boat to be available, they would be on the spot ready for salvage smacks or steamers to tow to vessels in distress, and very many lives be saved.

I have official records of evidence taken by myself at different times from life salvors and others, the details of which show this very prominently, but they would lengthen my paper beyond reasonable limits. Suffice it to say, that although Harwich salvors are second to none in humane courage, and annually save many lives in their ordinary smack boats, they are sometimes obliged to look on and see shipwrecked crews almost within speaking distance, drop exhausted one by one from the rigging and perish before their eyes, from the utter impossibility of their reaching them in a boat, through the shoal and broken water on sands like the Shipwash, Longsand and others. Such also was the evidence given by two of them some time ago to a naval officer, who was making enquiry on the subject by order of the Admiralty, with regard to the use of the raft as an adjunct to the mortar or rocket-apparatus. The following account of its trial in that respect, furnished by a gentleman practically acquainted with the subject, who was present on the occasion, is taken from the *Shipping and Mercantile Gazette*, of the 19th May last:—

“Some experiments were tried a few days ago at Harwich with a life raft, the invention of Mr. Wood, the receiver of wreck there. It is in shape like a letter A, and is firmly built of wood and cork combined. The spaces between the strokes of the letter are filled in with a rope netting. The invention, which promises to be of great value to salvors in saving life and property, and to the coast guard in connection with the mortar and rocket apparatus, was presented by Mr. Wood to the public; and the Mayor and Corporation of Harwich have raised a subscription in order to give the invention a trial. The raft was put together and shoved over the pier, and immediately it was in the water righted itself. It was towed away to a spot off the P Tower at Felixstowe, when a line was thrown over the tug-boat from a mortar apparatus on shore, and attached to it a double line, which being passed through a block, the raft was hauled backwards and forwards with ease by those on shore, showing its capabilities as a means of saving life from a vessel stranded and going to pieces on a lee shore. As many as 14 men got on board her at one time, and were landed across a strong tide. Experiments were then made with a view of ascertaining whether it was likely to capsize, and although 10 men got in one corner of it, they were unable to send it under or turn it over. On the whole, the experiments were highly successful. Capt. Jackson, R.N., of the coast

guard, will make an official report to the Admiralty on the subject."

Now, is it not probable that as a means of bringing a whole crew on shore at once it would, in many cases, be preferable to the breeches buoy, which can only bring one at a time, and with these additional advantages, that women and partially disabled men could avail themselves of it, and that, requiring no elevation as the breeches buoy does, there would be no necessity, in the case of a vessel being dismasted, to draw the people through the water at the risk of drowning them, as I fear does sometimes happen? That there was not the slightest difficulty in working it was proved at the trial; and if the Admiralty thought fit, such rafts might be kept at the various coast guard stations, where they might be the most likely to be of service, with much advantage, and at little cost, while at the same time they would not interfere with the use of the breeches buoy where its use appeared to be preferable.

As I wish this to be a simple, practical paper, I will now leave to consideration and discussion the merits of what I have brought forward, and should they lead to a trial of the means I have exhibited, and an increase of safety to life and property be the result, I shall feel that the anxious labour and expense I have incurred have not been incurred in vain.

In the very able paper recently read at the Society of Arts by Mr. Gray,* of the Board of Trade, the inadequacy of modern legislation as regards our merchant shipping to meet the ends sought to be attained was, I think, very forcibly demonstrated; but without venturing to offer an opinion as to whether an increase or a decrease in governmental interference would be the more beneficial to the public, I have endeavoured to show that in furtherance of the subjects under consideration there is much which might be easily and beneficially carried out, and that at a comparatively trifling cost of labour and money.

Many other uses for the use of the life raft or raft boat have been suggested to me, but as they are foreign to the subject of this paper, I will only briefly allude to one, as applicable to the signs of the times, viz., that they might be found useful as a means of landing troops, and even conveying a gun *inside* an enemy's range in shoal water, without the slightest chance of being sunk by shot.

LAW OF COPYRIGHT IN FRANCE.

The discussion in the Corps Legislatif of the bill for altering the law respecting the rights of authors, and of their heirs and representatives, has excited great interest, and the opinions expressed in the debate and the vote of the chamber have caused the Government to make an alteration in the original plan.

Under the laws lately in force every author possessed, during his whole life, the exclusive right of authorizing publication of his works by means of the press, on the stage, by engraving, or otherwise; if the author died leaving a widow married under what is called the régime of community, that is to say, the property of both man and wife being in common, the widow enjoyed the same privilege during her lifetime as regarded all works published by her husband during the marriage; if there were no widow, the rights passed to the descendants of the author for thirty years from his death; lastly, if he left no descendants but only parents, collateral relations, other representatives or legatees, the rights went to them only for ten years after the death of the author.

The new law, as proposed by the Government, extended the enjoyment of the rights to all heirs or representatives, whether direct or otherwise, to the term of thirty years after the death of the author, or that of his widow. It was also provided that those heirs or other representatives whose rights should be existing under the old law when the new one was promulgated, should

have the benefit of the alteration. This clause excited special interest, from the fact that the representatives of two of the most remarkable poets that France has produced, namely, Alfred de Musset and Alfred de Vigny, whose rights are now nearly expired, would, by the proposed law, have had them extended for twenty years.

The commission, of which M. Jules Simon was president, was divided in opinion, five out of the nine members of which it was composed being of opinion that intellectual property should be perpetual, like freehold; these five members, however, differed in matters of detail, and therefore a compromise was effected by which the term of thirty years mentioned above was increased to fifty.

In the chamber several points were raised and discussed with great warmth, but they principally related to the position of man and wife under the various régimes of marriage, and therefore have little interest out of France.

The result of the first discussion was to cause the commission to reconsider the clauses of the bill, which was afterwards carried, as regards its principal items. According to the new law, then, the rights of all heirs and representatives whatsoever are prolonged to fifty years from the death of the author. During these fifty years the widow or widower of the author, whatever may be the régime or conditions of the marriage, has a life-interest in such property, provided the author shall not have disposed of it during his lifetime or by will. The right of the widow or widower is annulled either by separation having been pronounced against the survivor, or by re-marriage.

The Corps Legislatif refused to sanction the clause which would have made the act retrospective, and consequently the rights of all heirs and representatives of authors who were dead previously to the passing of this new act remain untouched.

INTERNAL NAVIGATION IN FRANCE.

Recent official statistics give the following information respecting the internal navigation of France. The total length of the navigable rivers of the empire is stated to be 7,000 kilometres, or 4,376 miles English, this total including the embouchures or maritime portions of rivers, to the extent of 260 kilometres. Since the year 1835, the improvement of the fluvial navigation has been pursued with great zeal and success. Shallow rivers have been provided with weirs and sluices, and in others improved channels have been formed by means of sunken dams, which concentrate the water in a single way. All the great rivers of France have been more or less improved by these methods and by dredging, and the outlay for these purposes, since the year above mentioned, has reached to more than eight and a half millions sterling. Other important works are now in hand; the banks of the Marne and of the Upper Seine, between Montereau and the mouth of the Burgundy canal, are being straitened, and their beds deepened, so as to canalize these rivers in those parts; the Lower Seine, between Paris and La Briche, will soon be greatly improved by the construction of a weir and sluices at Suresnes, by the Bois de Boulogne; dams, which have greatly improved the Rhone, are now being continued in that portion of the river which lies between Lyons and Arles; a marine canal is being formed at St. Louis, to supply a navigable way, always accessible, in place of the tortuous and often impossible navigation by the mouths of the Rhone itself; on the Saone are being constructed five weirs, with sluice-gates, one at the Ile Barbe, and four between Chalons-sur-Saone and Lyons; this river is the high-water way between these two points, and an immense quantity of wine, charcoal, and wood are conveyed by it, but it is full of islands, shallows, and cross-currents, and is most inconvenient in every respect; works are also progressing on the Sarthe, the Mayenne, the Lot, the Vire, the Var, and other rivers. The navigable canals of France have a total length of

* See present Vol. of *Journal*, p. 239.

4,800 kilomètres, or 3,000 English miles; of these more than one-fifth are in the hands of companies or individual proprietors; the rest are maintained and worked by the state. About a hundred miles of canal are now in hand; the Canal de Vitry at Saint Dizier; the colliery canals of the Sarre, of Roubaix, from La Rochelle to Marans, and that of the Upper Seine, between Troyes and Bar-sur-Seine. In addition to these important works, the canals of the Upper Deule, the Canal du Centre, those of Brittany and of the Somme, that which connects the Rhone and the Rhine, and that of Burgundy, are all being improved, or about to be taken in hand. The internal navigation of France has for a long time been below the wants of the country; and now that the coal, iron, and other great industries are being rapidly developed, the improvement of the rivers and canals is an immense national benefit, the cost of which is trifling, as compared with the benefits which it must confer on the trade and commerce of the empire.

Fine Arts.

HISTORY OF THE FINE ARTS, BY CARDINAL FESCH.—It is said that amongst the papers of Joseph Bonaparte, formerly King of Spain, and left by the late Prince Musignano, are some highly important manuscripts of Cardinal Fesch, including a History of the Beaux Arts. The Cardinal was a great admirer of works of art, and a liberal patron of artists, and his own collection of pictures and sculptures was worth nearly a million and a half sterling.

DISCOVERY OF OLD MURAL PAINTINGS.—An interesting discovery has been made at Nancy, while demolishing an old chapel erected by Henry de Ville, Bishop of Toul, between the buttresses of the Cathedral. These paintings had been covered for many years by a coat of paint, but they are described as exhibiting remarkable finish in execution and brilliancy of colour; they are supposed to be by an Italian master of the fifteenth century, and the name of Fra Angelico de Fiesole is suggested as that of the artist. The chapel in which the paintings are is being demolished, in order to disengage the body of the cathedral from extraneous buildings, and an attempt will be made to transfer the pictures to canvas, for the museum of the town of Nancy.

ANNIVERSARY OF NICOLAS POUSSIN.—The birth-day of this famous painter was celebrated with great *éclat* on Friday, the 15th of June, at Andelys, where he was born, the expenses of the *fête* being defrayed by public subscription.

ART EXHIBITIONS ABROAD.—Summer visitors to the Continent have now excellent opportunities of judging of the taste for art which exists in all quarters. The exhibition established by the Society of the Friends of Art at Amiens is announced to open on the 14th of July and to remain open until the end of August. The fifteenth exhibition of the society bearing the same name at Boulogne opens on the 20th July, to close on the 15th of September. The annual exhibition at Grenoble will be held between the 15th of July and the 20th of August. This exhibition is managed by a local Art Society, which expends a considerable amount annually in the purchase of pictures, and the municipal authorities subscribe a sum equal to £240 towards the expenses; in addition to this the latter have announced that they will, this year, devote from four to five hundred pounds to the purchase of a picture, or pictures, at the exhibition, if any appear there which are thought worthy of a place in the museum of the town, which contains already a rich collection. An exhibition is now open at Orleans, to close on the 10th of July. The annual exhibition of the Academy of the Fine Arts at the Hague opened on the 4th of June, and was announced to remain open until the 4th of July. The triennial Exhibition of Fine Arts of Brussels, a highly important

one, opens on the 1st of August and closes at the end of September. Lastly, the seventh exhibition of works of Art has just opened its doors at Spa, and will last for two months. Such are a few of the means, increasing every year, by which the love of art and the interests of artists are cultivated abroad. The Paris Salon closed on the 20th June, but visitors will find in the same building, the Palais de l'Industrie in the Champs Elysées, a noble collection of the pictures of the old schools—Italian, Flemish, and French—lent by amateurs, principally ladies, for a charitable purpose. This exhibition, which has been open for some time, and is to remain so to the end of July, has just been enriched by a contribution of twelve works by the Empress, namely, four by Wouvermans, two by J. B. Pater, one each by Berghem, Van de Velde, Wynnants, Adrien Van Ostade, and Greuze, and a portrait in pastel of Louis XVII., by Madame Lebrun. In short, the exhibition in question is a collection of some three hundred gems, all of which belong to private cabinets, and have therefore the additional attraction of being new to the great majority of the public.

Manufactures.

LUCIFER MATCHES.—It appears that M. Gaillard has lately presented to the Academy of Sciences what he calls a new process of manufacturing common phosphorus matches. The method consists in reversing the ordinary mode of preparation. Instead of steeping the wooden slips first into sulphur and then into phosphorus, he plunges the matches into the phosphorus in the first place, and afterwards into the sulphur. This process is attended with several advantages. One of these is that sulphur is insoluble in water, and that, not being fusible under a temperature of about 128 Fahrenheit, there is no risk of accidental or intentional poisonings of food by these matches, since the sulphur forms an insoluble covering for the phosphorus. Another advantage depends on the hardness of the sulphur coating, which requires more friction than is ordinarily applied for its removal, and the laying bare of a portion of the phosphorus. This is calculated to decrease the risk of fires occurring accidentally from the too-ready inflammability of phosphorus as an outer covering for the lucifer match. How far this process is really new will be seen from the following extract from the "Transactions" of the Society of Arts, referring to a meeting held on May 21, 1846:—"The thanks of the Society were voted to Mr. C. M. Barker, for his improved congrève-match. Mr. Barker's improvement consists in putting a layer of sulphur over the combustible composition, instead of (as formerly) putting the composition on over the sulphur; so that it requires a temperature of nearly 300° to ignite the match by heat, and a greater quantity of friction than with those formerly used. Moreover, the match is not affected by damp."

DEFECTIVE SAFETY VALVES.—In a recent report to the Manchester Association for the Prevention of Boiler Explosions, Mr. Fletcher, the engineer, in speaking of a fatal explosion which occurred to a small boiler employed for winding at a colliery pit, after calling attention to the imperfection of the man-hole, which he regards as one cause of the explosion, goes on to say:—"The omission of the manhole mouthpiece was not the only defect in the equipment of this boiler, since it was fitted with but a single safety-valve, and that of the most dangerous construction. This safety-valve, which was an inch and one-eighth in diameter, was loaded with a spiral spring of so stubborn a character that it was found, on carefully testing it with hydraulic pressure after the explosion, that one turn of the nuts which held it down in its position was sufficient to raise the pressure from 80 lbs. to 150 lbs, while a second turn raised it from 150 lbs. to upwards of 200 lbs., so that there was but a turn of the nut be-

tween safety and explosion, or a single thread between life and death. So stubborn a spring as this would never admit of a free escape, and though the steam might just wheeze at the stated blowing-off point of 80 lbs., yet the pressure would rapidly rise on blowing-off freely. Added to this, the mode of securing the spring was most objectionable. It was held down in its position by a couple of ordinary nuts, operating on a cross-head carried by a couple of pillar bolts, on to which the nuts were screwed; but there were no collars on these bolts, neither were there any ferules slipped over them to prevent the nuts being over screwed, and thus the pressure being increased either by accident or design, although, as just shown, the precise position of the nuts was of so much importance. It would frequently be the engine-man's duty to take out the safety-valve to clean it and grind it up, and in order to do this the nuts securing the spiral spring would have to be taken off, when it would be a matter quite of haphazard in replacing them, whether, with so stubborn a spring as this was, the valve was screwed down to a pressure of 100 lbs. or 200 lbs. The arrangement was altogether a most dangerous pitfall, and the valve quite unfit to be used at all, but more especially to be the only one upon a portable boiler, which is, as a rule, worked by men of but average ability, and who, though they may be careful, are not mechanics."

Commerce.

COFFEE AND THE WAR.—Speaking of the influence of the present war upon the price of this commodity, Messrs. Travers say:—"Recent events have affected the value of coffee considerably, and there is a marked contrast between the present position of the market and what might reasonably have been anticipated three months ago. At that time the deliveries on the Continent of Europe, as well as in the United States, were proceeding satisfactorily; and although, on the other hand, crops had been large, and cultivation was being rapidly extended, it seemed that production and consumption were advancing in almost an even ratio, and that, at the worst, a ready market and a remunerative price could always be depended upon for all the finer kinds. The war in Germany has, however, partially closed the principal market, and a very severe decline in the prices of most kinds, notably in those of the finest descriptions of Ceylon, has immediately resulted—a decline which is not likely to be fully recovered for some time to come, as, whatever may be the duration of the war, it is sure to involve a large amount of privation and misery, sufficient, perhaps, to curtail consumption for several years after the restoration of peace. Nor is there any prospect of this falling off being balanced by a larger consumption in any other part of the Continent; on the contrary, appearances point rather in the opposite direction, and it seems as if England were the only country in Europe in which any improvement could be looked for. Even here much cannot be expected, especially now that the reduction of the duty on tea has caused so large an increase in the home consumption of that article, but an abundant supply of fine coffee, at moderate prices, will undoubtedly go far towards restoring it to its old place in public favour, and a reduction of duty, if it could be made—and surely no time is so seasonable as when the stock is heavy and likely to increase—would probably do so still more; while, if to moderate prices and a lower duty could be added any approximation to the skill in the preparation of coffee possessed by continental nations, a large additional quantity would doubtless be consumed in this country. Results such as these are not always obtained at once, and are at the best doubtful, and therefore for the present the only compensation for the depressed state of the European coffee market is to be sought in

the United States of America. Here there is a considerable stock, but the deliveries are progressing satisfactorily, and will probably continue to do so; America may therefore make heavy calls from time to time on the producing countries, but she will not supply the place of Germany as a market for the finer kinds, and should the crops turn out to be so large as is at present anticipated, prices must range lower than they did last year."

FRENCH TEA DUTIES.—Some alteration in the Customs' duties on tea imported into France have been recently made, the effects of which (say Messrs. Travers) may not improbably exercise before long a considerable influence on the prospects of the tea-market in England. By an Imperial decree dated May 30th, it is enacted that the tariff for the importation of tea shall henceforth be as follows:—40 francs per 100 kilogrammes of tea, if brought over from tea growing countries in French bottoms, and 100 francs per 100 kilogrammes, if imported from other countries and in foreign vessels, the usual port dues being included in this tariff. Taking the franc at 10d. and a single kilogramme at 2½ lbs., which is quite near enough for all practical purposes (100 kilogrammes being exactly equal to 220·48 lbs. avoirdupois), we find that the duty on tea imported in French bottoms will be 1½s. or nearly 2d. per lb., whilst that on tea in foreign vessels and from countries which do not grow tea, will be rather less than 5d. per pound (the exact sum being 4½d.). Hitherto the consumption of tea in France has been inconsiderable, partly owing to the apparently national predilection for the more stimulating beverage, coffee; partly, too, no doubt, to the high rate of duty imposed, which acted practically as a direct prohibition to its use. Referring to Mr. Newdegate's valuable work on the *Customs Duties of all Nations*, we find that the following scale was in force for tea imported in French bottoms; 6½d. per lb., if it came from India, 11d. per lb., if from the Black Sea, and a few other places, with the approval or countenance of the French consul, and as much as 1s. 9½d. if it came from any other country. One uniform duty of 2s. 2d. was levied on all teas imported in any vessels, other than French, no matter from what quarter of the world they came. The tendency of the recent alteration, whilst it may to some extent afford an opening for British commerce, is clearly to throw the trade as much as possible into the hands of the French, by giving them such a bounty as a reduction of two-thirds of the duty paid by foreign vessels. The favourable position which the French merchants will thus acquire as importers, will be precisely similar to the condition of our English merchants in the time of the Commonwealth, when enriched by the protective duties of our Navigation laws. Such laws are at the present day quite out of date.

THE COAL SUPPLY.—In the *Gazette* of the 2nd July it is notified that the Queen has been pleased to appoint the Duke of Argyll, K.T.; Sir Roderick Impey Murchison, Bart., K.C.B.; Sir William George Armstrong, Knt., C.B.; Henry Hussey Vivian, Esq.; George Thomas Clark, Esq.; Joseph Dickinson, Esq.; George Elliot, Esq.; Thomas Emerson Forster, Esq.; John Geddes, Esq.; Robert Hunt, Esq.; John Beete Jukes, Esq.; John Hartley, Esq.; John Percy, Esq., M.D.; Joseph Prestwich, Esq.; Andrew Crombie Ramsay, Esq.; and John Thomas Woodhouse, Esq., to be her Majesty's commissioners to investigate the probable quantity of coal contained in the coal-fields of the United Kingdom, and to report on the quantity of such coal which may be reasonably expected to be available for use; whether it is probable that coal exists, at workable depths, under the permian, new red sandstone, and other superincumbent strata; to inquire as to the quantity of coal at present consumed in the various branches of manufacture, for steam navigation, and for domestic purposes, as well as the quantity exported; and how far, and to what extent, such consumption and export may be expected to increase; and whether there is reason to believe that coal

is wasted, either by bad working or by carelessness or neglect of proper appliances for its economical consumption.

Colonies.

KEROSENE OIL IN NEW SOUTH WALES.—A Sydney paper says that energetic steps are being taken to develop this branch of commercial enterprise in this colony, and every step in advance only tends to confirm the great value of its oil-bearing minerals. It could scarcely be expected that in a colony like this, where few could have been acquainted with what is comparatively a new manufacture—the process of kerosene oil production not being many years old—the necessary works could be completed without the delay which prudent inquiry would necessitate. Whatever inducements there might be for prompt action in putting these mineral treasures into a marketable shape, no very large amount of the shales of Hartley, Wollongong, and Stoney Creek have yet been submitted for distillation, but the Australasian Mineral Oil Company have operated upon a considerable quantity of cannell from the Hunter district. The shales are well known to yield an oil of an excellent quality, though small in quantity, but this inferiority is to some extent qualified by the valuable coke that is left from the cannell, the shale leaving only a pale coloured ash. This company have constructed near Sydney extensive works replete with the appliances for an immense production. They have had the services of an engineer, who, added to his qualifications for superintendence in construction where so much machinery is required, has the not less important acquaintance with the *modus operandi* adopted in the largest and most successful oil-producing establishments in the United States.

THE PARIS EXHIBITION OF 1867 AND NEW SOUTH WALES.—The Commissioners appointed by the Government to carry out the necessary arrangements for the adequate representation of the arts, manufactures, and natural products of this colony, at the Paris Exhibition, have made a variety of appointments with a view to assist them in performing the duties entrusted to them. The offer by the Government, of Executive Commissioner, has been accepted by the Hon T. A. Murray, President of the Legislative Council, and a letter has been forwarded to the Secretary of the Science and Art Department, London, communicating this appointment, and stating that this colony would fully occupy the space allotted to it (namely, 1,000 feet), in the Exhibition. Five sub-committees have been formed—the first, to deal with matters of finance; the second to collect mineral specimens; the third to collect specimens of the vegetable products of the colony; the fourth to collect specimens of animal products; and the fifth to collect specimens of the arts and manufactures of the colony. A circular has been addressed to the several benches of magistrates, gold commissioners, public institutions, public companies, and persons residing in various parts of the colony, who, from their positions and occupations, are likely to aid in obtaining contributions, requesting their co-operation; and this circular is accompanied by a list of classified articles, specimens of which the Commissioners are desirous of obtaining.

WOOL PRODUCTION IN NEW SOUTH WALES.—It appears by a colonial journal that in a Parliamentary investigation, recently instituted to inquire into the condition of this colony, it was distinctly proved that the wool-producing powers of the land would be greatly increased if the runs were fenced in. Both the quality and the quantity of the wool would be improved. Fencing would thus repay its cost, and return a considerable profit on the investment. Many of the large squatters are said to be willing and anxious thus to invest capital in a way which, while it will increase their own profits, will improve the country and add to

its wealth, but they appear to be debarred by the fact that the leases at present granted are too short to justify the sinking of capital in such improvements as fencing.

Obituary.

Mr. R. GARRETT, the eminent agricultural implement manufacturer, died on the 26th June, in his 60th year. While Mr. Garrett was yet a young man—in the spring of 1836—the business of his father at Leiston, Suffolk, to which place his grandfather had gone as a sickle maker and blacksmith in 1778, was relinquished in his favour. At that time about 60 men and eight or ten horses were employed, but no steam power had yet been called into play at the works. The once small village has now become a town of more than 2,000 inhabitants, all dependent on the Leiston works. The 60 workpeople have increased to 600, the horse power has given place to steam power, and the name of Garrett has become known throughout Europe, in Egypt, Australia, and almost all over the world. The house of Garrett figured with honour also at the International Exhibitions of London, Dublin, Paris, Hamburg, Vienna, and Madrid, where it won no fewer than 60 gold medals and 60 silver ones, together with £1,200 in cash, and an immense number of honourable mentions. When the East Suffolk Railway, now merged in the Great Eastern system, was brought forward, Mr. Garrett found capital to the amount of £10,000. When the Albert Memorial College at Framlingham was suggested, Mr. Garrett came forward with a donation of £500. He was elected a member of the Society of Arts in 1848.

Notes.

SUBMARINE ROAD TO THE CONTINENT.—Mr. Hawkshaw, the well-known engineer, is engaged in the preliminary operations necessary to determining the practicability of a submarine road to the Continent. Borings are now being made at a considerable expense in the neighbourhood of Dover, and, by permission of the French Government, between Calais and Boulogne; and in the course of this summer explorations will be made in mid-channel. Some trials are essential, in order to obtain positive knowledge concerning the nature, extent, and thickness of the strata. It is proposed to carry on the excavations for the tunnel from both ends, as well as from shafts in the channel. At the top of the shafts powerful steam-engines will be erected for pumping, for drawing up the excavated material, and for supplying power to the machinery by which excavation will be effected. The tunnel will communicate on the French side with the Northern of France Railway, and on the English side with the South-Eastern and London, Chatham, and Dover Railways, "so that there will be an unbroken line of railway communication between London and Paris."

THE LAST OF THE COTTON FAMINE.—A report has been presented to Mr. Villiers, the president of the Poor-law Board, by Mr. Rawlinson, C.B., from which it appears that the Public Works Office in Manchester will be broken up this year, and that Mr. Arthur Arnold, the resident Government inspector, will leave the district. The report shows that the amount of money advanced under the public works (Manufacturing Districts) Acts, 1863-4 has been £1,343,806. Up to the 31st of March last £1,177,701 4s. 10½d. had been expended. The entire length of sewerage and drainage works executed at the same date was about 560,161 lineal yards, or about 318 miles; and the total area of paving and other surface work of street and highway improvement then completed was 2,131,167 superficial yards, or about 440 acres.

*** BENCH MARKS IN FRANCE.**—The *Builder* says:—A most important work is now in progress throughout

France, viz., the levelling and establishing of bench-marks all over the country. The object of this undertaking is to furnish a series of levels that will enable the course of canals, railways, &c., systems of drainage and irrigation, and other public and private works, to be laid down on the map and marked out on the ground without any error. The operations were commenced in 1857, under the control of the Minister of Public Works, and will be terminated in five or six years hence; the work has been, since the beginning, under the superintendence of M. Bourdaloue, civil engineer, to whom is due the series of levels taken for the Isthmus of Suez from the Mediterranean to the Red Sea. The datum line of the levels in France is the usual sea-level; the bench-marks established on the ground consist of cones of cast-iron, set in masonry, on the spot where the levels are required to be noted; and a great number of these have been placed in lines of level which touch seaport towns, groups of rivers and canals, lines of railway, roads, &c. More than 18,000 linear miles have been thus laid down as base lines; but, in order to complete the work, the operations must be extended to 120,000 miles. This gigantic undertaking is very costly; but, when once completed, it will enable every engineer or contractor, who may wish to attach a series of levels in any part of France with those of the remotest districts, to do this by aid of a bench-mark on the spot, or near at hand, for the maximum space between the levels is to be only three-quarters of a mile. The accuracy of these levels is such that they are true to three centimetres, or 1·2 inch for the whole length throughout France.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—At the forthcoming meeting of the association in Nottingham, the opening address will be delivered in the new theatre by Mr. W. R. Grove, Q. C., F. R. S., the president elect. Excursions of scientific interest will be taken to the Midland Railway works at Derby, Eastwood Riddings, Cinderhill, Annesley (the birthplace of Lord Byron's "Mary"), Newstead Abbey, the Derwent and the Wye Valleys and Charnwood Forest. The Dukes of Devonshire and Rutland, Mr. W. F. Webb, Mr. Ambrose de Lisle and other gentlemen have volunteered to entertain the members of the association at the above places.

MEETINGS FOR THE ENSUING WEEK.

MON......R. United Service Institution, 8½. 1. Commander P. H. Colomb, R. N., "Ships Lights at Sea." 2. Capt. Charles H. Curme, R. N., "A few remarks on the Rule of the Road, and suggestions for its amendment."

TUES....Ethnological, s. 1. Mr. T. White Baker, "On the Tribes of the Nile Basin." 2. Mr. Gilbert Malcolm Sproat, "On the West Coast Indians in Vancouver Island." 3. Lt. Col. A. Fytche, "On the Aborigines of the Andaman Islands."

WED....R. Literary Fund, 3.

SATR. Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par......*Delivered on 27th June, 1866.*
Numb.
 British Columbia and Vancouver Island—Further Despatch.
 United States—Correspondence respecting the termination of the Reciprocity Treaty.

SESSION 1865.

442. (p.) Poor Rates and Pauperism—Return (D).

Delivered on 28th June, 1866.

198. Bills—Local Government Supplemental (No. 2) (as amended by Select Committee).

199. " Charitable Trusts Deeds Enrolment.
 63. (vii.) Committee of Selection—Eighth Report.
 272. East India (Finance and Revenue Accounts)—Parts I. and II.
 363. Account Books (Public Departments)—Treasury Minute.
 368. Roman Catholic Prisoners (Middlesex)—Correspondence.

Delivered on 29th June, 1866.

216. Loan Societies—Abstract of Accounts.
 Persia—Convention.
 Commerce, Navigation, Reciprocity, &c.—Return of Treaties.

Delivered on 30th June, 1866.

68. (v.) Trade and Navigation Accounts (31st May, 1866).
 339. Cunard, &c., Steamers—Return.
 367. Corrupt Practices at Elections—Returns.

Delivered on 2nd July, 1866.

362. Strand Union Workhouse—Report by R. B. Cane.
 376. Cattle Diseases Prevention Act (1866)—Memorials.

Patents.

From Commissioners of Patents' Journal, June 29th.

GRANTS OF PROVISIONAL PROTECTION.

Artificial teeth, making—1546—M. C. Rogers.
 Bakers' ovens, heating—1608—J. Lunt.
 Roots, attaching soles and heels to—1480—C. Lock.
 Brushes—1592—A. Parkes.
 Buckles—1602—J. Holloway.
 Carding engines—1606—E. H. Waldenstrom and T. Wrigley.
 Cards—1582—H. J. Griswold.
 Coffins—1612—J. C. Cole.
 Corks and bungs, cutting—1549—C. McFarland.
 Drilling machines—1574—W. E. Newton.
 Dyeing—1537—A. Paraf.
 Feed suction, valves for regulating—1584—J. J. Ingram & G. R. Phillips.
 Fibrous materials for spinning, &c., preparing—1527—G. T. Bousfield.
 Fuel, combustion of—956—F. Wigg.
 Galvanic batteries—947—C. F. Carlier.
 Hats, c—1572—J. J. Friedmann.
 Ice, breaking—1416—J. Purcell.
 Journal boxes, composition for—1578—W. E. Newton.
 Kamptulicon—1564—A. Parkes.
 Keys, &c.—1515—E. T. Bellhouse and W. J. Dorming.
 Metals from their ores, separating—1256—F. Spence.
 Railways—1526—W. E. Newton.
 Safes—1570—A. Grivel, jun.
 Sound boards—1476—G. Green.
 Spinning frames—1588—D. Cochran.
 Steam boilers—1576—W. J. Fraser.
 Steam boilers, heating the feed water of—1589—A. Thornton.
 Steam generators—1408—W. A. Lyttie.
 Steel—1207—A. V. Newton.
 Thread, finishing—1533—H. and J. Crawford.
 Waggon or carts—1604—F. Cambridge.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Surfaces, printing—1683—T. S. Hudson.

PATENTS SEALED.

22. W. Buckley.	172. W. Schmier.
24. G. S. Robertson.	239. J. W. Swan.
25. B. Blackburn.	262. A. S. Brooman.
57. J. Hodges.	639. E. W. Otway.
72. H. Hutchinson.	908. J. Parkes, jun., & J. Parkes.
73. A. Leighton.	1277. G. T. Bousfield.
135. H. E. Newton.	

From Commissioners of Patents' Journal, July 3rd.

PATENTS SEALED.

39. J. Ronald.	94. C. Bartholomew.
42. E. Walker.	120. H. F. Smith.
43. H. D. P. Cunningham.	122. C. G. Johnson.
44. W. Winter.	189. W. E. Gedge.
49. W. G. Beattie.	209. G. B. Woodruff.
54. T. W. Roys.	240. T. Spencer.
55. J. Kerridge & W. Peverett.	315. E. Candler.
56. A. Gibb.	334. J. H. Johnson.
60. F. Wise.	356. T. Spencer.
67. J. M. Macrum.	483. A. H. Hassall.
87. C. O. Papengouth.	503. J. H. Whitehead.
88. J. W. Gray.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1604. H. G. Craig.	1712. F. G. B. Westmacott.
1788. A. Montleart and W. Tent.	1833. J. Blake.
1619. G. Davies.	1639. J. H. Johnson.
1647. A. A. Croil.	1644. J. and J. Cole, jun.
1710. P. G. B. Westmacott.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1546. T. Wight.	1567. R. A. Brooman.
1559. T. Bell.	1562. J. A. Wilkinson.

Registered Designs.

An Improved Oval Brush—June 19—4796—H. Reed, Birmingham.
 A Filter for Filtering Wine—June 29—4797—Farrow and Jackson, Great Tower-street, City.
 Design for the Internal Fitting of Boxes or Cases for holding Bottles or other like Articles—July 3—4798—F. J. Campbell, 77, Lower Thames-street, City.